CLAIMS

1. An electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode, having a characteristic of the electroluminescent layer includes a layer formed by co-deposition of an organic compound and a metal salt, and said organic compound includes at least one each of a proton-donating functional group showing Bronsted acid and a functional group having a non-covalent electron pair.

2. The electroluminescent device according to claim 1, having a characteristic of the proton-donating functional group is any functional group selected from a group of a hydroxyl group, a carboxyl group and a mercapto group.

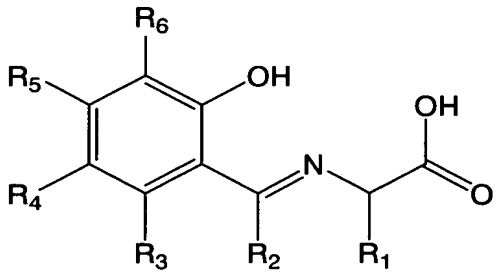
3. The electroluminescent device according to claim 1, having a characteristic of the functional group having the non-covalent electron pair is any functional group selected from a group of a heterocyclic residue group, an azomethine group and a carbonyl group.

4. The electroluminescent device according to claim 1, having a characteristic of the proton-donating functional group is any functional group selected from a group of a hydroxyl group, a carboxyl group and a mercapto group, and the functional group having the non-covalent electron pair is any functional group selected from a group of a heterocyclic residue group, an azomethine group and a carbonyl group.

5. The electroluminescent device according to claim 1, having a characteristic of the metal salt is any one selected from a group of a metal acetate salt, a metal halide and a metal alkoxide.

6. An electroluminescent device comprising at least an anode, a cathode and

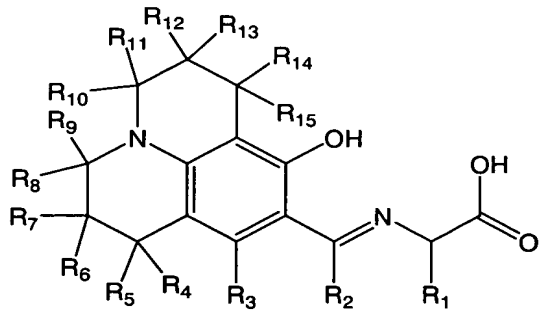
an electroluminescent layer provided between the anode and the cathode, having a characteristic of the electroluminescent layer includes a layer formed by co-deposition of an organic compound and a metal salt, and the organic compound is a compound represented by a following general formula (1):



(1)

(wherein R1 - R6 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group (however limited to 1 - 10 carbon atoms), a substituted or non-substituted aryl group (however limited to 1 - 20 carbon atoms), or a substituted or non-substituted heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R3 and R4, R4 and R5 or R5 and R6 may be mutually bonded to form a benzene ring or poly-condensed rings (however limited to 1 - 20 carbon atoms). And R1 and R2 may be mutually bonded to form a pyridine ring).

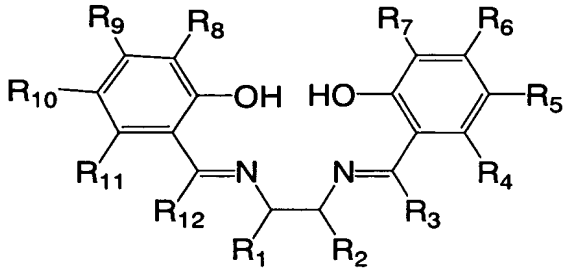
7. An electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode, having a characteristic of the electroluminescent layer includes a layer formed by co-deposition of an organic compound and a metal salt, and the organic compound is a compound represented by a following general formula (2):



(2)

(wherein R1 - R15 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group (however limited to 1 - 10 carbon atoms), a substituted or non-substituted aryl group (however limited to 1 - 20 carbon atoms), or a substituted or non-substituted heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R1 and R2 may be mutually bonded to form a pyridine ring).

8. An electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode, having a characteristic of the electroluminescent layer includes a layer formed by co-deposition of an organic compound and a metal salt, and said organic compound is a compound represented by a following general formula (3):

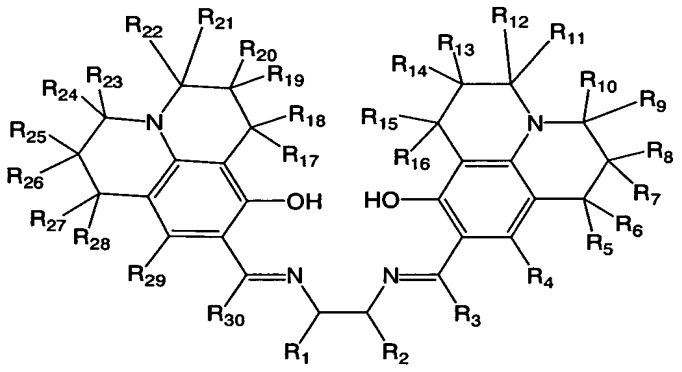


(3)

(wherein R1 - R12 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group (however limited to 1 - 10 carbon atoms), a substituted or non-substituted aryl group (however limited to 1 - 20 carbon atoms), or a substituted or non-substituted heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R1 and R2

may be mutually bonded to form a cycloalkane structure, a benzene ring or poly-condensed rings (however limited to 1 to 20 carbon atoms). And R4 and R5, R5 and R6, R6 and R7, R8 and R9, R9 and R10 or R10 and R11 may be mutually bonded to form a benzene ring or poly-condensed rings (however limited to 1 - 20 carbon atoms). And R2 and R3 or R1 and R12 may be mutually bonded to form a pyridine ring).

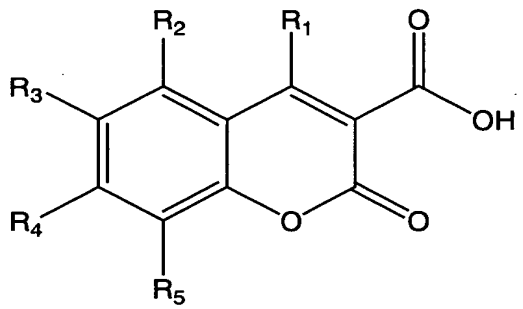
9. An electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode, having a characteristic of the electroluminescent layer includes a layer formed by co-deposition of an organic compound and a metal salt, and the organic compound is a compound represented by a following general formula (4):



(4)

(wherein R1 - R30 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group (however limited to 1 - 10 carbon atoms), a substituted or non-substituted aryl group (however limited to 1 - 20 carbon atoms), or a substituted or non-substituted heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R1 and R2 may be mutually bonded to form a cycloalkane structure, a benzene ring or poly-condensed rings (however limited to 1 to 20 carbon atoms). And R2 and R3 or R1 and R30 may be mutually bonded to form a pyridine ring).

10. An electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode, having a characteristic of the electroluminescent layer includes a layer formed by co-deposition of an organic compound and a metal salt, and the organic compound is a compound represented by a following general formula (5):



(5)

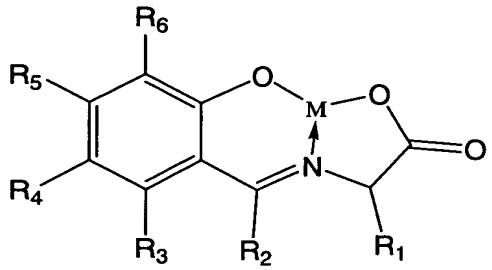
(wherein R1 - R5 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group (however limited to 1 - 10 carbon atoms), a substituted or non-substituted aryl group (however limited to 1 - 20 carbon atoms), or a substituted or non-substituted heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R4 may represent any of an amino group, a dialkylamino group, and an arylamino group. And R2 and R3, R3 and R4 or R4 and R5 may be mutually bonded to form a benzene ring or poly-condensed rings (however limited to 1 to 20 carbon atoms). And R3 and R4, or R4 and R5 may be mutually bonded to form a julolidine skeleton).

11. The electroluminescent device according to any one of claims 6 to 10, having a characteristic of the metal salt is any material selected from a group of a metal acetate salt, a metal halide and a metal alkoxide.

12. The electroluminescent device according to any one of claims 6 to 10, having a characteristic of the metal salt is any material selected from a group of zinc,

aluminum, silicon, gallium and zirconium.

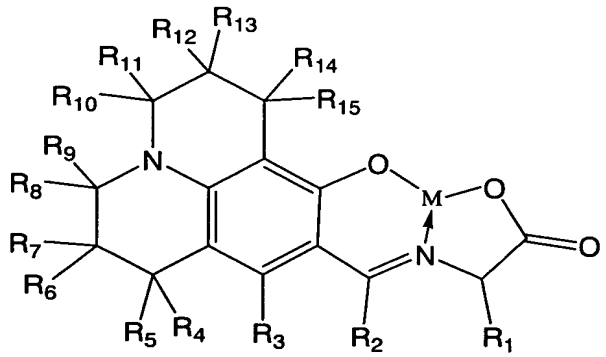
13. An electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode, having a characteristic of the electroluminescent layer is formed by co-deposition of an organic compound and a metal salt, and includes a metal complex having a structure represented by a following general formula (6):



(6)

(wherein M represents a saturated or unsaturated metal ion. R1 - R6 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group (however limited to 1 - 10 carbon atoms), a substituted or non-substituted aryl group (however limited to 1 - 20 carbon atoms), or a substituted or non-substituted heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R3 and R4, R4 and R5 or R5 and R6 may be mutually bonded to form a benzene ring or poly-condensed rings (however limited to 1 - 20 carbon atoms). And R1 and R2 may be mutually bonded to form a pyridine ring).

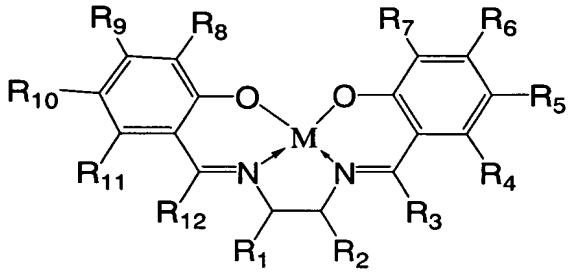
14. An electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode, having a characteristic of the electroluminescent layer is formed by co-deposition of an organic compound and a metal salt, and includes a metal complex having a structure represented by a following general formula (7):



(7)

(wherein M represents a saturated or unsaturated metal ion. R1 - R15 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group (however limited to 1 - 10 carbon atoms), a substituted or non-substituted aryl group (however limited to 1 - 20 carbon atoms), or a substituted or non-substituted heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R1 and R2 may be mutually bonded to form a pyridine ring).

15. An electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode, having a characteristic of the electroluminescent layer is formed by co-deposition of an organic compound and a metal salt, and includes a metal complex having a structure represented by a following general formula (8):

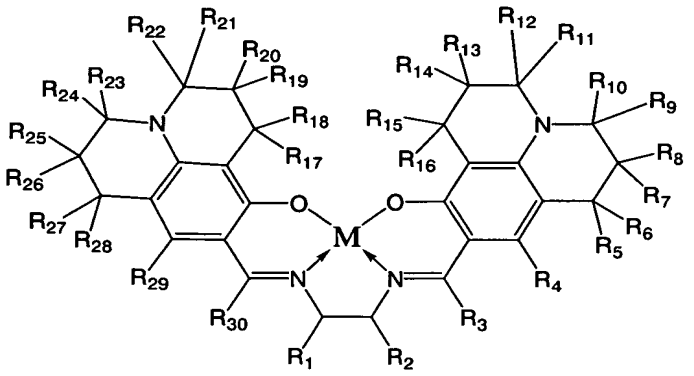


(8)

(wherein M represents a saturated or unsaturated metal ion. R1 - R12 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group (however limited to 1 - 10 carbon atoms), a

substituted or non-substituted aryl group (however limited to 1 - 20 carbon atoms), or a substituted or non-substituted heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R1 and R2 may be mutually bonded to form a cycloalkane structure, a benzene ring or poly-condensed rings (however limited to 1 to 20 carbon atoms). And R4 and R5, R5 and R6, R6 and R7, R8 and R9, R9 and R10 or R10 and R11 may be mutually bonded to form a benzene ring or poly-condensed rings (however limited to 1 - 20 carbon atoms). And R2 and R3 or R1 and R12 may be mutually bonded to form a pyridine ring).

16. An electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode, having a characteristic of the electroluminescent layer is formed by co-deposition of an organic compound and a metal salt, and includes a metal complex having a structure represented by a following general formula (9):

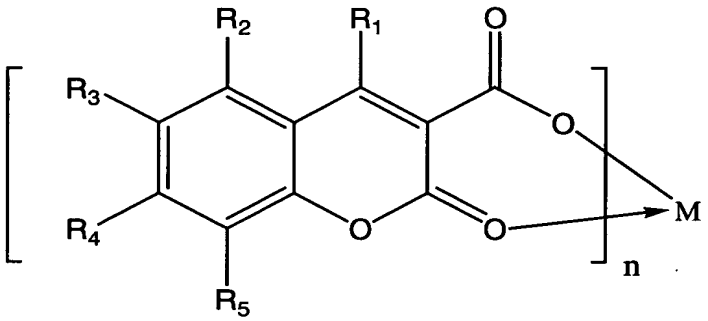


(9)

(wherein M represents a saturated or unsaturated metal ion. R1 - R30 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group (however limited to 1 - 10 carbon atoms), a substituted or non-substituted aryl group (however limited to 1 - 20 carbon atoms), or a substituted or non-substituted heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R1 and R2 may be mutually bonded to form a cycloalkane

structure, a benzene ring or poly-condensed rings (however limited to 1 to 20 carbon atoms). And R2 and R3 or R1 and R30 may be mutually bonded to form a pyridine ring).

17. An electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode, having a characteristic of the electroluminescent layer is formed by co-deposition of an organic compound and a metal salt, and includes a metal complex having a structure represented by a following general formula (10):



(10)

(wherein M represents a saturated or unsaturated metal ion. R1 - R5 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group (however limited to 1 - 10 carbon atoms), a substituted or non-substituted aryl group (however limited to 1 - 20 carbon atoms), or a substituted or non-substituted heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R4 may represent any of an amino group, a dialkylamino group, and an arylamino group. And R2 and R3, R3 and R4 or R4 and R5 may be mutually bonded to form a benzene ring or poly-condensed rings (however limited to 1 to 20 carbon atoms). And R3 and R4, or R4 and R5 may be mutually bonded to form a julolidine skeleton. And n represents an integer from 1 to 4).

18. The electroluminescent device according to any one of claims 13 to 17,

having a characteristic of the metal ion is constituted of any element selected from zinc, aluminum, silicon, gallium and zirconium.

19. A method for manufacturing an electroluminescent device including at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode and including one or plural organic compound layers, having a characteristic of a step of forming at least one of the organic compound layers comprises a step of co-depositing an organic compound including at least one each of a proton-donating functional group showing Bronsted acid and a functional group having a non-covalent electron pair, and a metal salt.

20. The method for manufacturing the electroluminescent device according to claim 19, having a characteristic of the proton-donating functional group is any functional group selected from a group of a hydroxyl group, a carboxyl group and a mercapto group.

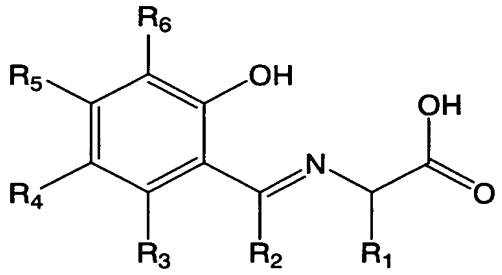
21. The method for manufacturing the electroluminescent device according to claim 19, having a characteristic of the functional group having the non-covalent electron pair is any functional group selected from a group of a heterocyclic residue group, an azomethine group and a carbonyl group.

22. The method for manufacturing the electroluminescent device according to claim 19, having a characteristic of the proton-donating functional group is any functional group selected from a group of a hydroxyl group, a carboxyl group and a mercapto group, and the functional group having the non-covalent electron pair is any functional group selected from a group of a heterocyclic residue group, an azomethine group and a carbonyl group.

23. The method for manufacturing the electroluminescent device according to claim 19, having a characteristic of the metal salt is any one selected from a group

of a metal acetate salt, a metal halide and a metal alkoxide.

24. A method for manufacturing an electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode including one or plural organic compound layers, having a characteristic of a step of forming at least one of the organic compound layers comprises a step of co-depositing an organic compound represented by a following general formula (1) and a metal salt:

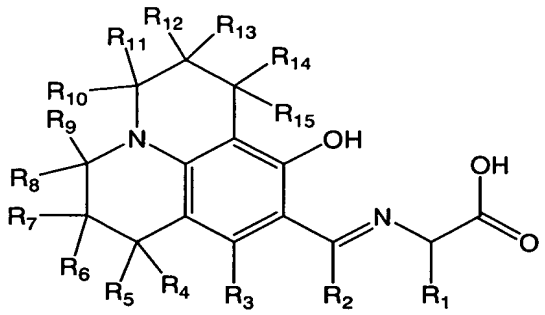


(1)

(wherein R1 - R6 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group (however limited to 1 - 10 carbon atoms), a substituted or non-substituted aryl group (however limited to 1 - 10 carbon atoms), or a substituted or non-substituted heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R3 and R4, R4 and R5 or R5 and R6 may be mutually bonded to form a benzene ring or poly-condensed rings (however limited to 1 - 20 carbon atoms). And R1 and R2 may be mutually bonded to form a pyridine ring).

25. A method for manufacturing an electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode including one or plural organic compound layers, having a characteristic of a step of forming at least one of the organic compound layers comprises a step of co-depositing an organic compound represented by a following

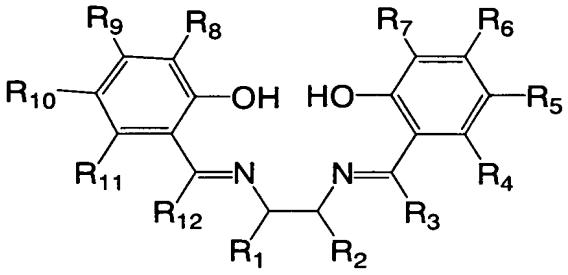
general formula (2) and a metal salt:



(2)

(wherein R1 - R15 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group (however limited to 1 - 10 carbon atoms), a substituted or non-substituted aryl group (however limited to 1 - 20 carbon atoms), or a substituted or non-substituted heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R1 and R2 may be mutually bonded to form a pyridine ring).

26. A method for manufacturing an electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode including one or plural organic compound layers, having a characteristic of a step of forming at least one of the organic compound layers comprises a step of co-depositing an organic compound represented by a following general formula (3) and a metal salt:

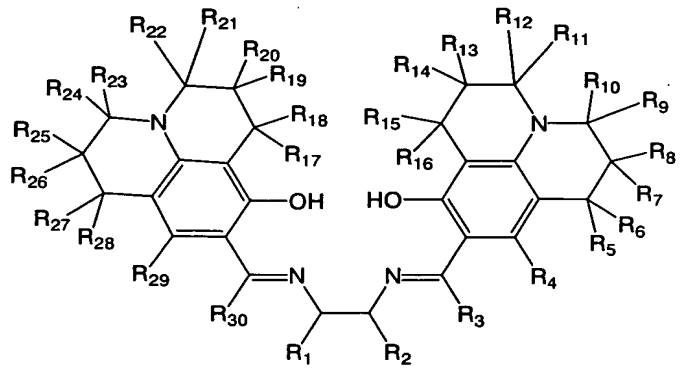


(3)

(wherein R1 - R12 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group

(however limited to 1 - 10 carbon atoms), a substituted or non-substituted aryl group (however limited to 1 - 20 carbon atoms), or a substituted or non-substituted heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R1 and R2 may be mutually bonded to form a cycloalkane structure, a benzene ring or poly-condensed rings (however limited to 1 to 20 carbon atoms). And R4 and R5, R5 and R6, R6 and R7, R8 and R9, R9 and R10 or R10 and R11 may be mutually bonded to form a benzene ring or poly-condensed rings (however limited to 1 - 20 carbon atoms). And R2 and R3 or R1 and R12 may be mutually bonded to form a pyridine ring).

27. A method for manufacturing an electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode including one or plural organic compound layers, having a characteristic of a step of forming at least one of the organic compound layers comprises a step of co-depositing an organic compound represented by a following general formula (4) and a metal salt:

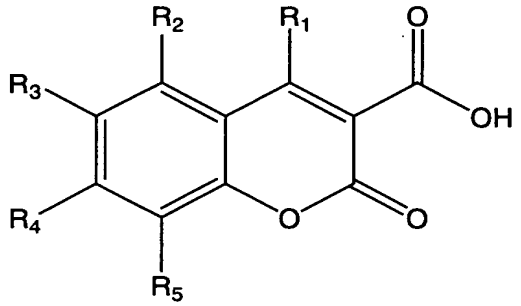


(4)

(wherein R1 - R30 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group (however limited to 1 - 10 carbon atoms), a substituted or non-substituted aryl group (however limited to 1 - 20 carbon atoms), or a substituted or non-substituted

heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R1 and R2 may be mutually bonded to form a cycloalkane structure, a benzene ring or poly-condensed rings (however limited to 1 to 20 carbon atoms). And R2 and R3 or R1 and R30 may be mutually bonded to form a pyridine ring).

28. A method for manufacturing an electroluminescent device comprising at least an anode, a cathode and an electroluminescent layer provided between the anode and the cathode including one or plural organic compound layers, having a characteristic of a step of forming at least one of the organic compound layers comprises a step of co-evaporating an organic compound represented by a following general formula (5) and a metal salt:



(5)

(wherein R1 - R5 each represents a hydrogen element, a halogen element, a cyano group, an alkyl group (however limited to 1 - 10 carbon atoms), an alkoxyl group (however limited to 1 - 10 carbon atoms), a substituted or non-substituted aryl group (however limited to 1 - 20 carbon atoms), or a substituted or non-substituted heterocyclic residue group (however limited to 1 - 20 carbon atoms). And R4 may represent any of an amino group, a dialkylamino group, and an arylamino group. And R2 and R3, R3 and R4 or R4 and R5 may be mutually bonded to form a benzene ring or poly-condensed rings (however limited to 1 to 20 carbon atoms). And R3 and R4, or R4 and R5 may be mutually bonded to form a julolidine skeleton).

29. The method for manufacturing the electroluminescent device according

to any one of claims 24 to 28, having a characteristic of the metal salt is any material selected from a group of a metal acetate salt, a metal halide and a metal alkoxide.

30. The method for manufacturing the electroluminescent device according to any one of claims 24 to 28, having a characteristic of the metal salt includes any metal element selected from a group of zinc, aluminum, silicon, gallium and zirconium.